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(57) Claim

A system comprising an electrical mains power circuit, electrical devices connected to and powered by the mains power circuit and each including a two-way communication component adapted to receive coded signals on said mains power circuit and being responsive thereto so as to i) transmit preprogrammed response signals onto said mains power circuit including safe-to-connect signals and ii) effect operation of the device according to the coded signal, and a control unit which transmits said coded signals onto said mains power circuit in response to i) human control input and ii) preprogrammed procedures which are interactive with said device response signals received from the mains power circuit, including transmitting coded signals effecting mains power connection only to said devices which are transmitting safe-to-connect signals.

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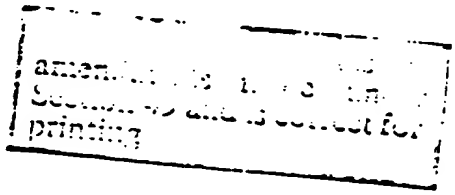

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Related Art :

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Petty Patent Specification for the invention entitled:

"Smart Home/Neighbourhood Watch System"

The following statement is a full description of this invention including the best method of performing it known to us:-

This invention relates to a communication and control system with particular use in a domestic household. It provides for the monitoring, control and assurity of safety of electrically powered devices such as lighting, general appliances and even security (burglar) alarm systems.

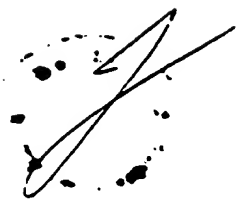
It is known in the prior art to provide certain control signals to electrical appliances by modulating the power supply with an appropriate signal, a common example being the control of off-peak water storage heaters. Mains power carrier signals have also been used to establish a more centralised control of utilities within a large building, for instance, to control lighting throughout an office complex.

In the present invention a useful effect has been obtained by the use of a variety of co-operative devices maintained in two way communication with one another.

Summary of the Invention

In one broad form the invention can be said to provide a system comprising an electrical mains power circuit, electrical devices connected to and powered by the mains power circuit and each including a two-way communication component adapted to receive coded signals on said mains power circuit and being responsive thereto so as to i) transmit preprogrammed response signals onto said mains power circuit including safe-to-connect signals and ii) effect operation of the device according to the coded signal, and a control unit which transmits said coded signals onto said mains power circuit in response to i) human control input and ii) preprogrammed procedures which are interactive with said device response signals received from the mains power circuit, including transmitting coded signals effecting mains power connection only to said devices which are transmitting safe-to-connect signals.

Preferably the devices are utilitarian appliances whereby said communication component acts as a transceiver producing and receiving said signals characterised to be transmitted



on said mains power wiring at a signal frequency other than the mains frequency.

Throughout this specification the terms "utilitarian appliances" and "appliance" define any electrically powered or connected device which provides a useful, aesthetic or other affect and includes lighting, heating, cooling, monitoring, cooking, washing entertainment and sundry household devices.

By way of example only, one preferred form of the invention will now be described with reference to the accompanying drawings in which:-

Fig. 1 schematically shows a component layout within a domestic household; and

Fig. 2 shows schematically a typical suburban area in which the invention has been implemented.

A domestic household includes a large number of electrically powered appliances which are activated and deactivated according to various needs. A simple example of such appliances is electrical lighting. More complicated, but still within the scope of such electrically powered appliances, is an intruder alarm system. Traditionally such electrically powered appliances include a manually operable switch so as to activate or deactivate according to the requirements. However, some appliances such as televisions, video units and audio leisure equipment are commonly becoming available with remote controls such as remote infrared units. Such remote control units send a signal on the appropriate carrier such as infrared light, which is detected by the appliance and causes the predesigned effect e.g. changing channels on the television.

In the domestic system illustrated in Fig. 1, control signals can be applied to the various appliances by the master unit 1 by way of signals carried on the mains power circuits about the house. Simple appliances such as

lights 3 will have only the option of being active or inactive and the control signal emitted from the master unit 1 will include an identification code in order that the signal will only effect the intended appliance. In order to effect the switching between inactive and active states the light 3 is associated with its own light switch which will respond to the control signal if it includes the appropriate code portion.

The instruction from the master control unit 1 may be more than a mere on/off instruction, for example it may instruct a television receiver to activate and select a particular station or for a audio set to output to particular speakers at a particular volume level.

The information transfer between the master unit 1 and the various appliances is two way. For instance a portable appliance 11 connected to a controlled power point 2 receives an interrogation signal from the master unit 1 and replies with its own identification code. The master unit 1 is programmed with information relating to each such appliance including its normal power requirements, any time restrictions regarding use of the appliance, and so forth. So long as it is a valid appliance the master control unit 1 may transmit a control signal to the appropriate controlled power point 2 to activate the appliance 11. Of course, if foreign objects such as small screw drivers, scissors etc. are inserted into a control power point, the interrogation sequence will result in a negative or illegal status and no power will be supplied by that power point 2. As another example, the master unit 1 may be programmed such that an electric toaster cannot be operated from a controlled power point 2 within a bathroom.

Taking further advantage of the two-way communication between the master control unit 1 and the various appliances, for example by controlling the quantity of

power supplied to a light via light switch 3 in response to a signal from a connected photo cell 4 or a movement detector 5 (e.g. infrared cell, pressure mat or reed switches at door entries). Thus lighting levels can be controlled according to ambient light conditions and lights can be automatically switched on or off, as appropriate, according to the entry and exit of occupants of a particular region or room.

The master control unit 1 is conveniently programmed and controlled by a portable infrared keyboard 1a. Suitable infrared receivers can be installed in any location so that control of the whole system can be effected from any desirable point. Typically appliances such as air conditioning units might be desirably controlled from many different locations.

As previously mentioned the information transfer is carried out by a signal imposed upon the mains circuitry of the household. In order to prevent stray signals from outside the household producing spurios effects, a filter 10 is included in the mains supply within the fuse board. However, further benefits can be had by also including a external mains connection control 16 within the fuse board which will allow the transfer of information across the filter 10 so long as it is preceded by a pre-programmed security code. This allows a preselected selection of separate power users 12 to belong to a common network for the purposes of security or neighbourly watching. For example, an abnormal occurrence such as a high temperature within a refrigerator indicating some fault in operation can warn selected neighbours when a household is vacant and those neighbours can attend to the problem in order to prevent possible water damage and/or loss of produce. Furthermore, incorrect entry of the premises, to be assumed to be by a burglar, will also provide an indication in selected

neighbouring households or a security company where appropriate action can be taken to apprehend the illegal entrant.

Further enhancing security, selected appliances 8 and/or 11 can include an integral security appliance which responds to master control unit 1 interrogation with a coded identifying signal which will maintain a security siren within the appliance 1 inactive. Should the appliance 11 be disconnected from a power point 2 or 13, the master control unit 1 will detect that disconnection and will transmit the pre-programmed alarm signals onto the mains line. Further, the disconnection of the appliance 11 from the power point 2 or 13 will result in the integral security alarm producing a high volume audio alarm signal and electrically isolating the main components of the appliance 11 from its power lead. Thus, until the appliance 11 is reconnected to a power point 2 or 13 within a mains circuit including the master control unit 1 that recognises the coded identity of that appliance 11, the appliance 11 is in-operative and produces an audio alarm signal.

The master control unit 1 can further be connected via a telephone line within the household so that any communication from an external telephone 15, in conjunction with a phone audio link keyboard 14, allows transfer of information such as status reports and control signals between the master control unit 1 and the external phone audio link keyboard 14. The external phone 15 and keyboard 14 can be simply audio linked by the close placement of their co-operative speakers and microphones and the information transferred by the use of tone signals.

Thus the system allows preselected neighbouring houses 12 to participate in a close monitoring neighbourhood watch type scheme with the transfer of alarm messages from one household 12 to the other households 12.

Selected portable appliances 11 can be protected against theft and made in-operative to any burglar. The master control unit 1 can monitor mains faults such as active to earth/neutral to earth leakages or unrecognised appliances being inserted into power points 2 and to cut appropriate power supply in such circumstances. Electrical appliances can be automatically switched on and off, maintaining the ability of manual override, in a manner providing more convenience and better use of electricity such as off-peak electricity. The general status of the home, in particular its electrical appliances, can always be obtained by an interrogating telephone call.

Clearly, although the invention has been exemplified in a particular embodiment, it should be understood to generally cover a very broad scope as earlier described in the specification.

It will be recognised by persons skilled in the art that numerous variations and modifications may be made to the invention as described above without departing from the spirit or scope of the invention as broadly described.

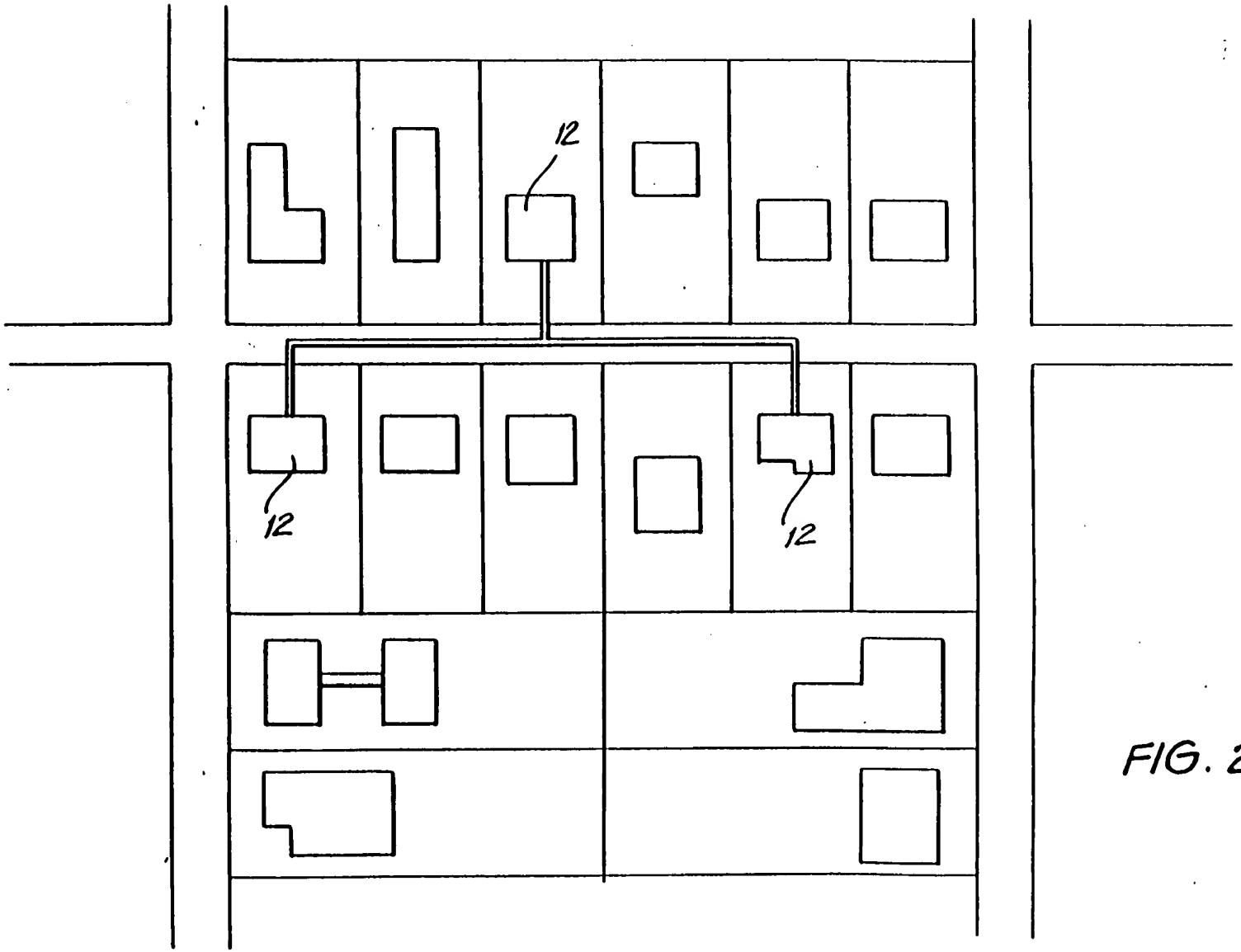


FIG. 2